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**Evaluation of a 4- Versus 6-Week Length of Stay
in the Navy's Alcohol Treatment Program¹**

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Executive Summary

Problem

The U.S. Navy's inpatient alcohol treatment program has operated with an excellent benefit-to-cost ratio. However, attempts to balance escalating health care costs with resource downsizing have prompted program administrators to consider reducing the standard length of stay in treatment from 6 weeks to 4 weeks. Concerned that even a small decrement in the efficacy of a 4-week program could cancel out the savings gained, Navy administrators requested that a study be conducted to determine whether the proposed reduction could be accomplished without a significant loss of efficacy in treatment outcome.

Objective

The objectives of this report were to (1) determine whether a 4-week inpatient treatment program for alcohol abusers is as effective as a 6-week program, and (2) explore the potential for matching patients to a 4- or 6-week length of stay according to the severity of their condition at entry into treatment.

Approach

A total of 2,823 active-duty inpatients—1,380 in the 6-week program, 1,443 in the 4-week program—participated in the evaluation, which was conducted at 12 Navy treatment facilities. Baseline data on patient demographics, family background, clinical profile, and treatment characteristics were obtained from participants and their counselors when the patients entered treatment. One-year follow-up data concerning alcohol use, behavior problems, retention on active duty, reason for discharge (if applicable), career status, job performance, and quality of life were obtained from participants, their work supervisors, their Drug and Alcohol Program Advisors (DAPAs), and automated Navy personnel master files. Hierarchical multiple regression analyses were conducted to assess the effect of length of stay on outcome after controlling for other prognostic indicators, as well as to examine patient-program interaction effects.

Results

Program membership failed to explain any of the observed differences in any of the seven criterion measures, once the effects of other predictors had been taken into account. The single best predictor of success at one year was months of aftercare attendance; paygrade level was also a consistent predictor of outcome (higher paygrade = better outcome). However, severity of condition at entry into treatment was nonsignificant in the regression equations, as were the interaction terms between patient characteristics and length of stay.

Conclusions

It was concluded that a reduction in length of stay from 6 weeks to 4 weeks in the Navy's inpatient alcohol treatment program would not have an adverse effect on outcome. It was recommended that further research explore patient-treatment matching algorithms within various combinations of length of stay and treatment modality (e.g., outpatient care) to enhance both treatment effectiveness and medical cost savings.

Acknowledgements

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Introduction

Since the late 1970's, alcoholism treatment has experienced tremendous growth as part of the burgeoning health care industry, due largely to the sponsorship of both private and federal health care plans (Holder et al., 1991). Treatment is considered financially pragmatic: total health care costs for treated alcoholics have been found to decline as much as 55% from their highest pretreatment levels, while costs for untreated alcoholics continued to rise (Holder and Blose, 1992). Yet as the nation shifts to managed care delivery systems, the financing and structure of substance abuse services are undergoing rapid and fundamental changes. Reimbursing agencies still provide coverage but are increasing their restrictions on admissions and length of stay, while researchers are continuing to examine relationships between duration of treatment, treatment modality, and outcome variables (Miller and Hester, 1986; Walsh et al., 1991).

Length of stay in residential alcohol treatment programs has been the focus of considerable research, yet findings have been inconsistent. In a surprising and now classic British study, Edwards et al. (1977) found that a single "advice" session with a counselor was as effective as several months of in- and outpatient treatment among a group of alcoholic married men. It has also been reported that short hospitalizations (1 to 5 days) were associated with good prognosis among young Navy alcoholics, while prognosis was universally poor for young men with longer hospital stays (Gunderson and Schuckit, 1978). But more researchers have weighed in in favor of longer treatment duration. A second British study comparing brief intervention (advice only) with extended in- or outpatient treatment found that those who were offered extended treatment were functioning better and had fewer alcohol-related problems at the end of two years than did their briefly counseled cohorts, even though abstinence rates did not differ between the two groups (Chick et al., 1988). Others have found longer lengths of stay associated with lower readmission rates (Moos and Moos, 1995; Peterson et al., 1994) and greater overall improvement in outcomes (McLellan et al., 1982; Sheehan et al., 1981; Smart, 1978).

Still others have found no significant outcome differences between treatments of varying lengths: 60 days plus aftercare versus 90 days without aftercare (Pokorny et al., 1973); 20 days versus 82 days (Willems et al., 1973); 9 days versus 21 days (Mosher et al., 1975); 9 days versus 30 days (Stein et al., 1975); 2 weeks versus 7 weeks (Walker et al., 1983); and 3 weeks versus 5 weeks (Page and Schaub, 1979). In their review of the literature, Miller and Hester (1986) concluded that no overall advantage was demonstrated for longer or more intensive programs over shorter or less intensive interventions in treating alcohol abuse. McCaul and Furst (1994) also cited growing evidence that brief interventions, particularly for abusers who are not yet physically dependent on alcohol, are as effective in reducing alcohol use and improving health status as are more extended treatment protocols.

Some researchers have argued that any evaluation of length of stay must take into consideration the severity of the patient's condition (Gottheil et al., 1992). To this end, McLellan and colleagues developed the Addiction Severity Index (ASI) to differentiate patients in terms of their psychiatric symptoms at admission (McLellan, Luborsky, et al., 1980; McLellan, O'Brien, and Kron, 1980). Applying the ASI to the study of length of stay, they found that alcoholic patients with less severe impairment experienced significantly better outcomes with longer lengths of stay, while high-severity patients did not appear to benefit from longer periods of treatment (Gottheil et al., 1992). Yet predictor data generally have suggested that more severely deteriorated individuals may be *more* likely to benefit from longer, more intensive treatment (Miller and Hester, 1986). Clearly, for both medical and fiscal reasons, further work is needed in matching patients to appropriate lengths of stay.

A large population with somewhat unique characteristics and treatment requirements is the United States military. The percentage of heavy drinkers in the military is generally higher than among civilians, even after controlling for sociodemographic differences between the two populations (Bray et al., 1992). More than 10,000 new cases of alcoholism are treated each year in military hospitals and rehabilitation facilities (Grodin, 1991), and researchers have found that rates of hospitalization for illnesses other than alcoholism are higher among alcohol abusers than controls throughout their service careers (Kolb and Gunderson, 1981). Because alcohol abuse is considered incompatible with military readiness and performance, the Department of Defense (DoD) has offered treatment to alcohol-dependent personnel for more than 25 years. The U.S. Navy, which operates the largest of the military residential treatment programs, accounting for almost half of all active-duty alcohol inpatients DoD-wide, is particularly concerned with cost-effectiveness issues.

The Navy's standard 6-week alcohol treatment program has operated with an excellent benefit-to-cost ratio of more than 13 to 1, calculated in terms of the avoided replacement costs of program successes (Devine et al., 1989). However, attempts to balance escalating health care costs with resource downsizing have prompted program administrators to consider reducing the standard length of stay in treatment from 6 weeks to 4 weeks. The immediate benefits of such a change in terms of per-patient cost-savings and expeditious return of members to their regular duties could be offset by longer-range losses, however. The costs of replacing a trained and highly skilled individual in the naval work force are quite high. Even a small decrement in the efficacy of a 4-week program could cancel out the savings gained. Therefore, the Bureau of Naval Personnel (BUPERS) and the Bureau of Medicine and Surgery (BUMED) jointly requested that a study be conducted to determine whether the proposed reduction in treatment time could be accomplished without a significant loss of efficacy in outcome.

This paper is the second of two reports summarizing the results of that study. The first report (Trent, 1995) presented a comprehensive description of enrollees in the standard 6-week program and the instruments used to evaluate their status at intake and after 12 months. It also assessed the program's overall effectiveness and delineated the factors associated with treatment success after one year. The objectives of the present report are twofold. First, participants in the 6-week program will be compared with participants in a trial, 4-week program on seven key outcome measures to determine whether a 4-week length of stay is as effective as 6 weeks. The second objective is to

explore the potential for differentially assigning patients to a 4- or 6-week program according to salient patient characteristics at intake, particularly the severity of their psychological dysfunction. Such a matching procedure, if successful, could enable program directors to capture some of the cost-savings afforded by a reduced length of stay while minimizing the risk of undertreating needier patients.

Method

Treatment setting

In 1992, the Navy operated 25 residential alcohol rehabilitation facilities worldwide. BUPERS and BUMED directed that the evaluation be limited to facilities that were (1) conducting the standard 6-week program, (2) operating within the United States, and (3) serving primarily an active duty Navy patient population. Of the 16 facilities that met these criteria, 12 agreed to participate in the evaluation. All followed an open-format, milieu-based treatment protocol centered around the philosophy and practices of Alcoholics Anonymous (AA). Within this overriding structure, treatment directors were free to develop their own curricula, though basic elements were similar across facilities. Treatment of Navy members is, to some extent, coerced; a sailor can be ordered into rehabilitation regardless of whether he/she has voluntarily requested such assistance. Failure to comply with the treatment regimen can lead to expulsion from treatment and, usually but not always, discharge from naval service. Counselors determine a patient's actual length of stay in treatment based on the individual's responsiveness and needs; however, most enrollment terms coincide with the intended length of stay. An individualized aftercare program is mandated for one year, and patients in recovery are monitored by their command Drug and Alcohol Program Advisor (DAPA).

Participants

All patients presenting for treatment at the participating facilities between February 1992 and May 1994 constituted the pool of potential research participants. To be eligible for the evaluation, participants had to be active-duty Navy personnel with at least one year of service completed and at least one year of obligated service remaining. Only first-time program enrollees with a primary diagnosis of alcohol dependence and no major psychiatric disorder were accepted into the study. Participation in the research was voluntary; approximately 91% of all eligible, incoming patients agreed to participate. Patients who did not qualify for inclusion and those who declined to participate continued in the regular treatment program with the study volunteers. Research participants were assured of strict confidentiality and provided with a detailed consent form to sign. A total of 2,823 volunteers took part in the evaluation: 1,380 in the 6-week program, and 1,443 in the 4-week program. Demographic composition of the two samples is presented in the Results section.

Research design

There was insufficient staffing at the facilities to support a parallel design in which 4- and 6-week programs were conducted concurrently at the same facility. Wide variations in the size and typical

demographic composition of the patient populations among facilities also precluded dividing the facilities into experimental and control groups, wherein half would offer a 4-week program while the other half remained at 6 weeks for the entire data collection period. Therefore, all facilities began the evaluation with their 6-week program in place and switched to a 4-week program after approximately 14 months. Assignment of participants to a 6-week or 4-week length of stay was therefore dependent on when the patient enrolled in treatment. Although a counterbalanced *ab/ba* design would have been sounder methodologically, program administrators preferred this *ab* design for several reasons: (1) to minimize the disruption imposed by the study (a counterbalanced design would have required several facilities to convert immediately to a 4-week curriculum, then revert to their 6-week programs at the halfway point), (2) to help dispel staff resistance to shortening the treatment program, and (3) to give program directors adequate time to fashion their 4-week curricula. To help compensate, a thirteenth facility was included as a control for extraneous or seasonal effects occurring during the course of data collection. This facility had already converted to a 4-week program and was to remain at 4 weeks throughout the evaluation; however, it was closed during Navywide downsizing about a year after the study began and was unable to fulfill its intended role.

Because the treatment programs were continuous and open-ended, the last patients to be admitted under the 6-week treatment protocol and the first ones admitted under the 4-week protocol shared the same therapy groups and living quarters for a period of time. To avoid possible data contamination resulting from these contacts, all patients enrolled in either program during this transitional "washout" period were excluded from the study.

Follow-up began as soon as a participant was discharged from treatment. All participants, including those who failed to complete the treatment program, were tracked for a period of one year. Follow-up data collection concluded in August 1995.

Baseline data collection

Program counselors completed an Intake Questionnaire (demographic, background, and diagnostic data) and an Exit Questionnaire (length of stay, prognosis, disposition) for all participants, regardless of how long they remained in the program or their reason for discharge. Counselors also administered a set of five questionnaires to all study volunteers, including (1) the Alcohol Use Inventory (AUI) (Horn and Wanberg, 1969; Horn et al., 1990), (2) the Symptom Checklist (SCL-90-R) (Derogatis, 1983; Derogatis et al., 1976), (3) the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q) (Endicott et al., 1993) (4) the Healthier People Health Risk Appraisal (Carter Center of Emory University, 1990), and (5) a Family Questionnaire compiled by administrative personnel at BUPERS and BUMED. These instruments and their administration have been described in detail elsewhere (Trent, 1995). All but the Family Questionnaire (and the Exit form) were completed during the first week in treatment; the Family Questionnaire was administered sometime after the third week to give participants time to begin addressing family issues in therapy. When a participant was discharged from treatment, the counselor returned all seven completed questionnaires to the Naval Health Research Center (NHRC).

Follow-up data collection

As soon as NHRC was notified that a study participant had left treatment, a follow-up questionnaire was mailed to the DAPA at the member's receiving command, asking that the DAPA begin documenting the individual's compliance with the recovery program for one year. At the end of the year, a courtesy reminder to complete and return the questionnaire was mailed to the DAPA, along with two follow-up questionnaires for the participant to complete: a second Q-LES-Q and a Confidential One-Year Follow-Up Questionnaire. In addition, a Supervisor's Assessment of Treatment Effectiveness was mailed to the participant's commanding officer for appropriate distribution to the individual's work supervisor. If forms were not returned to NHRC within several weeks, a follow-up request was sent to the nonrespondents, along with another set of questionnaires.

Independent and dependent measures

Twenty-four independent variables representing four predictor domains—demographic characteristics, personal background, clinical profile, and treatment variables—were included in the evaluation, based on previous research indicating potentially significant associations between them and treatment outcomes (see Trent, 1995). Among the 24 independent variables were three severity indices. The Global Severity Index (GSI) on the SCL-90-R was used to measure psychological dysfunction at entry into treatment. The GSI, which is the instrument's best single indicator of an individual's current level of disorder, has been found to correlate favorably with the psychiatric factor on the ASI (Gottheil et al., 1992; McLellan et al., 1983). A second severity measure was the global scale of alcohol involvement, ALCINVOL, on the AUI. The ALCINVOL index is based on particular item responses concerning the benefits, consequences, concerns, and styles associated with an individual's drinking pattern. The third severity index was a 6-item scale measuring severity of alcohol dependence. The scale's six dependency symptoms—tremors, morning drinking, loss of control of drinking, blackouts, missing meals, and continuous drinking (Cronbach's $\alpha = .67$)—have been associated with poor prognosis (Polich et al., 1980).

Seven outcome variables were used to assess treatment effectiveness: (1) *alcohol use* (a 5-point scale from the DAPA questionnaire: 1 = Totally abstinent, 2 = Essentially abstinent/a couple of "slips", 3 = Drinks occasionally, 4 = Drinks frequently, and 5 = Drinks very heavily), (2) *retention on active duty* (a 5-point scale reflecting time to discharge from naval service after leaving treatment: 1 = Less than 3 months, 2 = 4 to 6 months, 3 = 7 to 9 months, 4 = 10 to 12 months, 5 = Not discharged within one year), (3) *reason for discharge* (scored only if the member was discharged within one year: 1 = Undesirable [alcohol/drugs/misconduct], 0 = All other reasons), (4) *number of negative incidents* (total number of problems or incidents, such as alcohol-related work absences or legal/disciplinary actions, occurring within the follow-up year), (5) *job performance rating* (1 = Unsatisfactory, 2 = Marginal, 3 = Satisfactory, 4 = Highly satisfactory), (6) *recommendation for reenlistment or advancement* (1 = Yes, 0 = No), and (7) *quality of life* (5-point overall satisfaction scale on the Q-LES-Q, ranging from 1 = Very poor, to 5 = Very good). All measures except quality of life were obtained from objective sources (DAPA questionnaire, Supervisor's Assessment, or official Navy personnel records); quality of life was based on the participants' self-report at follow-up.

Program content analysis

Each facility provided a detailed treatment schedule for their 6- and 4-week programs, along with a statement summarizing the changes that had been made to reduce the original program to 4 weeks. The syllabuses were content-analyzed by two raters who initially worked independently, then met for joint discussions in an iterative evaluation process. The main objective was to determine whether the 4-week program differed substantively from the 6-week protocol. After identifying the major program elements represented in the syllabuses (e.g., small group therapy, AA meetings, physical training), the raters quantified the percentage of total program hours allotted each element within the 6- and 4-week programs at each facility. Consensus was reached on every rating. The designated percentages were then averaged across facilities for the two programs separately to produce an average percentage score for each program component within each protocol. The 6- and 4-week protocols were compared in terms of the proportion of time allotted each element.

Statistical methods

To clarify the role of length of stay relative to the other independent variables, a two-step multivariate approach was used. First, correlational analyses between the independent variables and the criterion measures were computed separately for the 6-week and 4-week samples. Any predictor that correlated with at least one outcome at $p \leq .01$ was retained for further analyses. This procedure resulted in 16 predictors that were significantly associated with one or more outcomes within either the 6- or 4-week samples, or both (12 variables were significant in both groups). Interaction effects between program duration and the 16 prognostic indicators were computed by multiplying the program variable (1 = 6 weeks, 2 = 4 weeks) with each predictor variable. In the second step, hierarchical multiple regression procedures were employed to remove the effects of the independent variables on outcomes before assessing the impact of length of stay (program) (Tabachnick and Fidell, 1989). Analyses were performed on the full combined sample ($N = 2,823$). For each outcome measure, the 16 independent variables were entered into the equation in a stepwise manner; then the program variable was forced in; finally, the interaction terms were entered in stepwise fashion into the last phase of the regression. Because of the large sample size and number of variables involved, the .01 alpha level was selected a priori as the criterion for entry in the stepwise tests.

Results

Follow-up response rates

Unadjusted response rates for the four follow-up questionnaires were calculated by dividing the number of usable forms returned by the total number in the sample. Adjusted rates were based on the number of *possible* returns and were calculated by first subtracting from the divisor the number of targeted recipients who could not be contacted because the participant had left the Navy or the command had been disestablished. There were no significant differences in response rates between the 6- and 4-week samples on any of the follow-up instruments. Therefore, the rates are presented for the total sample ($N = 2,823$), with adjusted rates followed by unadjusted rates (in parentheses):

Confidential DAPA Record, 79% (77%); Supervisor's Assessment of Treatment Effectiveness, 77% (74%); Participant's Confidential One-Year Follow-Up Questionnaire, 60% (40%); and Participant's Q-LES-Q (Quality of Life Questionnaire), 59% (40%).

Program content analysis

Twelve main curriculum elements were identified in the program content analysis: AA meetings, didactics (e.g., lectures, films), small group therapy, physical training, study time (Big Book), community meetings, journal writing, relaxation training, self-help sessions, field day, administrative requirements (e.g., orientation, testing), and free time. Of these, the greatest amount of time (about 29%) was devoted to AA meetings, followed by didactics (15%) and small group therapy (14%). The smallest proportions of time were scheduled for self-help, journal work, and relaxation training (1% to 2% for each). In general, the facilities reduced the time devoted to any given treatment component by about one third to achieve their 4-week programs. Program differences in the percentage of time scheduled for each element were assessed using tests for the significance of difference between two proportions. The tests were nonsignificant for every program element. Thus, although the 4-week protocol comprised fewer treatment hours, it remained proportionally nearly identical to the 6-week protocol in terms of content.

Participant samples

Table 1 summarizes the demographic, personal background, clinical, and treatment characteristics of the two program samples. In addition to the 24 predictors targeted for study, the table includes age, extension in treatment (more than 3 days beyond the designated 6 or 4 weeks), and a binary variable indicating aftercare attendance (yes/no). The 4-week participants presented a significantly better profile at entry into treatment. Compared with the 6-week participants, they were older and more likely to be married and have children living with them. Their family background was less likely to include an alcoholic parent, and they were much less likely to have been abused as children. They had fewer legal/disciplinary difficulties and somewhat more satisfactory social relationships prior to their enrollment in the treatment program. In terms of the severity of their alcoholism, the 4-week sample had started drinking at a later age, were drinking less at entry into treatment, were less likely to require chemical detoxification, less likely to be polydependent, and had lower scores on alcohol involvement, alcohol dependency, and psychiatric dysfunction. A greater percentage of 4-weekers successfully completed the treatment program, and although they were no more likely to have attended aftercare meetings than were the 6-weekers, they attended for a longer period of time.

Overall outcome

Scores on the seven outcome measures for the 6-week and 4-week program participants are presented in Table 2. Higher scores reflect better outcomes on retention, job performance, career recommendation, and quality of life; they reflect poorer outcomes on alcohol use, negative incidents, and pejorative reason for discharge. While differences between the two groups were small, all of them favored the 4-week sample. It is inappropriate to compare these scores directly, however, since

TABLE 1. Comparison of 6- and 4-week program samples on independent variables at entry into treatment.

Variable	6-week sample (<i>n</i> = 1,380)	4-week sample (<i>n</i> = 1,443)	<i>t</i> or χ^2 (<i>df</i>)	<i>p</i> ≤
DEMOGRAPHIC CHARACTERISTICS				
Age (yrs; mean ± SD)	26.7 ± 6.1	27.3 ± 6.2	2.66 (2,820)	.01
Sex				
Men	95.1 %	95.1 %		n.s. ^a
Women	4.9 %	4.9 %		n.s.
Paygrade group				
E1 - E3	30.3 %	27.6 %		n.s.
E4 - E6	61.2 %	62.8 %		n.s.
E7 - E9	6.0 %	7.5 %		n.s.
Officers	2.5 %	2.1 %		n.s.
Education				
< 12 yrs	5.8 %	3.3 %		n.s.
12 yrs	72.0 %	75.5 %		n.s.
> 12 yrs	22.2 %	21.2 %		n.s.
Race				
White	79.4 %	78.4 %		n.s.
Black	12.1 %	12.2 %		n.s.
Other	8.5 %	9.3 %		n.s.
Married	34.1 %	38.2 %	4.73 (1)	.05
Children at home	54.3 %	62.0 %	8.33 (1)	.01
PERSONAL BACKGROUND				
Broken home (childhood)	54.0 %	55.2 %		n.s.
Parent/guardian with alcohol problem	58.5 %	53.8 %	5.73 (1)	.05
Family member treated for alcoholism	21.1 %	19.5 %		n.s.
Abused as a child (physical/emotional /sexual)				
Men	43.3 %	30.8 %	44.28 (1)	.001
Women	67.7 %	62.0 %		n.s.
Overall	44.5 %	32.4 %	43.16 (1)	.001
Age at first drink (yrs; mean ± SD)	13.6 ± 4.4	14.1 ± 4.0	2.93 (2,641)	.01
Legal/disciplinary incidents (number; mean ± SD)	1.9 ± 2.0	1.7 ± 1.8	2.68 (2,796)	.01
Treated previously for alcoholism	24.5 %	27.2 %		n.s.
Social relationships scale (mean ± SD)	3.8 ± 0.8	3.9 ± 0.8	3.24 (2,800)	.01
CLINICAL PRESENTATION				
Drinks per day (mean ± SD)	6.5 ± 7.9	5.4 ± 7.0	4.01 (2,705)	.001
Detoxified at intake	6.2 %	2.9 %	16.60 (1)	.001
Polydependent (alcohol plus drugs)	5.3 %	1.9 %	22.21 (1)	.001
Alcohol involvement (ALCINVOL; mean ± SD)	20.2 ± 11.3	17.9 ± 10.9	5.35 (2,730)	.001
Psychiatric symptomatology (GSI; mean ± SD)	.64 ± .54	.59 ± .55	2.36 (2,795)	.05
Dependency scale (mean ± SD)	3.4 ± 1.7	3.1 ± 1.7	4.93 (2,705)	.001
TREATMENT VARIABLES				
Days in treatment (mean ± SD)	40.7 ± 7.6	28.5 ± 4.6	51.82 (2,820)	.001
Extended in treatment (> 3 days)	13.7 %	14.3 %		n.s.
Completed treatment	89.6 %	94.2 %	19.67 (1)	.001
Attended aftercare	89.3 %	89.6 %		n.s.
Months of aftercare attendance (mean ± SD)	8.3 ± 4.6	8.8 ± 4.5	2.28 (1,581)	.05
Antabuse compliance (if prescribed)	16.9 %	14.8 %		n.s.

^a Not significant

the 4-week participants presented a clinically stronger profile at the outset. Therefore, Table 2 was compiled for descriptive purposes only, and multiple regression procedures were used to control for initial differences between the two samples in assessing the comparative efficacy of the 6- and 4-week programs.

TABLE 2. Average outcome scores by alcohol treatment program (6 vs. 4 weeks), unadjusted for group differences at entry into treatment.

Outcome	6-week program (<i>n</i> = 1,380)	4-week program (<i>n</i> = 1,443)
Alcohol use (DAPA scale; mean \pm SD)	2.04 \pm 1.24	1.92 \pm 1.16
Negative incidents (number; mean \pm SD)	1.39 \pm 2.33	1.19 \pm 2.21
Retention on active duty (time category; mean \pm SD) (Time to discharge)	4.31 \pm 1.22	4.45 \pm 1.12
Undesirable discharge (Alcohol/Drugs/Misconduct)	61.4%	56.7%
Job performance rating (mean \pm SD)	3.22 \pm 0.97	3.36 \pm 0.84
Recommended for reenlistment/advancement	87.3%	89.2%
Quality of life (Q-LES-Q scale; mean \pm SD)	4.13 \pm 0.64	4.16 \pm 0.60

Results of the hierarchical regression analyses are presented in Table 3. Months of aftercare attendance was the single best predictor of outcome, accounting for most of the explained variance in six of the criterion measures: alcohol use, negative incidents, retention on active duty, reason for discharge, job performance, and recommendation for career reenlistment/advancement. Paygrade was the second-best predictor, entering significantly into five of the regression models. The three severity measures made almost no contribution to the prediction equations, however. Psychiatric severity (GSI) accounted for about 1% of the variance in quality of life, and alcohol involvement (ALCINVOL) contributed marginally to the prediction of retention; otherwise, severity of an individual's condition at intake was not related to outcome at one year. The program-by-predictor interaction terms were also nonsignificant in all but one isolated instance, where *program* by *children at home* accounted for less than 1% of the observed difference in career recommendation. Logistic regressions computed for the two dichotomous variables—undesirable discharge and recommendation for reenlistment/advancement—produced essentially the same results as the linear models.

TABLE 3. Results from hierarchical regression analyses of a 4- versus 6-week alcohol treatment program and patient-treatment interactions on outcomes after one year, controlling for other prognostic indicators.

Outcome	Predictor	β	Beta	R	Adj R ²	$p \leq$
Alcohol use	Aftercare	-.142	-.537	.573	.329	.001
	Paygrade	-.113	-.153	.593	.350	.001
	Program ^a	-.024	-.010	.593	.350	.719
	(constant)	3.734				
Negative incidents	Aftercare	-.214	-.425	.455	.206	.001
	Paygrade	-.174	-.124	.471	.220	.001
	Program ^a	-.063	-.014	.471	.219	.656
	(constant)	3.978				
Retention on active duty (Time to discharge)	Aftercare	.110	.425	.517	.266	.001
	Completed treatment	.982	.227	.564	.316	.001
	Paygrade	.079	.109	.575	.328	.001
	ALCINVOL	-.010	-.095	.583	.336	.001
	Program ^a	.005	.002	.583	.336	.937
	(constant)	2.365				
Undesirable discharge (alcohol/drugs/misconduct)	Aftercare	-.055	-.477	.480	.221	.001
	Program ^a	-.050	-.051	.480	.217	.524
	(constant)	.885				
Job performance	Aftercare	.075	.374	.416	.172	.001
	Paygrade	.094	.167	.447	.198	.001
	Program ^a	.088	.057	.450	.199	.122
	(constant)	2.101				
Recommended for reenlistment/advancement	Aftercare	.024	.335	.366	.133	.001
	Paygrade	.019	.097	.382	.144	.001
	Program ^a	-.021	-.033	.382	.143	.838
	Program x Children	.037	.099	.392	.150	.006
	(constant)	.592				
Quality of life	Social functioning	.171	.214	.280	.077	.001
	GSI	-.239	-.134	.303	.089	.003
	Program ^a	.009	.007	.303	.087	.847
	(constant)	3.648				

^a The variable *Program* is included to demonstrate its lack of effect in the prediction equation.

Most notably, program membership failed to explain any of the observed differences in any of the outcomes, once the effects of other predictors had been accounted for. That is, length of stay (4 or 6 weeks) did not have a significant effect on outcome. To be certain that length of stay was fairly and fully represented in the analyses, the regressions were performed again using two other versions of the length of stay variable. One was a continuous measure indicating the actual number of days spent in treatment, regardless of program assignment; the other was the dichotomous program variable, recomputed to exclude participants who had been extended in treatment for more than 3 days beyond the intended length of stay for their program (i.e., more than 45 days in the 6-week program or 31 days in the 4-week program). Results from these analyses were the same: length of stay did not contribute to the prediction of any outcome.

Analyses within stratified sample

Because the severity measures displayed only a very weak association with outcome and their interactions with program duration were entirely nonsignificant, further analyses using a severity-stratified sample were not performed. However, the clear and significant relationship between paygrade and outcome suggested that, in this military population, stratifying on paygrade might reveal significant interaction effects between patient characteristics and length of stay that were not evident in the unstratified sample (e.g., McLellan et al., 1983). Therefore, the entire sample was divided into three paygrade groups—E1 to E3 ($n = 816$), E4 to E6 ($n = 1,751$), and E7 and above (including all officers; $n = 256$)—and the regression analyses were recomputed within each stratum. With one minor exception, both length of stay and the interactions between program duration and other independent variables failed to make a significant contribution to the prediction of treatment outcome at any paygrade level.

Participant assessment of treatment length

On the assumption that the participants themselves might provide an important perspective on the issue of treatment length, the follow-up questionnaire asked participants whether the amount of time they had spent in treatment was “appropriate,” “too long,” or “not long enough.” The majority of respondents—78% in both the 4- and 6-week samples—answered “appropriate.” While approximately 13% of participants in the 4-week program felt that their treatment had not been long enough, about the same proportion in the 6-week program—14%—stated that their program had in fact been too long. Outcome scores among the 4-week/“too short” respondents were not significantly different from those of other 4-weekers (both “appropriate” and “too long”) except on quality of life, where the “too short” group reported lower life satisfaction (mean [\pm SD] = $3.78 \pm .67$) than either of the other two groups (mean [\pm SD] = $4.22 \pm .56$ and $4.26 \pm .66$ for “appropriate” and “too long,” respectively, $t = -5.43$, 532 df, $p \leq .001$ and $t = -4.12$, 130 df, $p \leq .001$). Comparisons between the 4-week/“too short” participants and all 6-week respondents also resulted in no significant outcome differences except on quality of life, where the former group again reported lower satisfaction (mean [\pm SD] = $3.78 \pm .67$ and $4.12 \pm .64$ for the 4-week/“too short” and total 6-week groups, respectively, $t = -4.25$, 592 df, $p \leq .001$). Yet when the 4-week/“too short” respondents were compared with 6-week/“too short” participants only, this difference on life satisfaction disappeared. Examination of

overall Q-LES-Q satisfaction scores across all six subgroups—4-week/6-week program by too long/too short/appropriate length—revealed that the two “too short” groups had the lowest scores, not only at follow-up, but at entry into treatment as well. Thus, although some 4-week participants felt that their treatment program was not long enough, objective measures of treatment success indicated that their rehabilitation was as successful as that of their cohorts in both the 4-week and 6-week programs. However, subjective satisfaction with quality of life was lower among both the 4-week/“too short” and 6-week/“too short” participants.

Discussion

This study sought to determine whether a 4-week residential treatment program for alcohol abusers in the U.S. Navy was as effective as a 6-week program. Using a prospective design and a multidimensional assessment approach, the study captured a broad array of patient data from several different domains, including patient demographic characteristics, personal background, family history, behavioral and psychological dysfunction, alcohol intake, severity of dependency, use of Antabuse, and compliance with treatment and aftercare. Criterion measures were likewise multidimensional and included alcohol intake, adverse events potentially related to alcohol use, retention on active duty, reason for discharge (if applicable), job performance ratings, supervisor's recommendation for continued service or career advancement, and participants' perceived quality of life. The risks of statistical error involved in analyzing such a large number of variables were mitigated by (1) recruiting an unusually large sample of alcohol program participants for the evaluation, (2) obtaining high follow-up response rates, (3) relying on multiple and primarily objective sources of outcome data, (4) employing robust multivariate analytic procedures, and (5) establishing the criterion for all tests of significance at the conservative $p \leq .01$ alpha level. In particular, the large sample afforded considerable power to detect even small effect sizes (see Cohen, 1988, p. 413).

Results were clear and consistent, providing strong evidence that a reduction in length of stay from 6 weeks to 4 weeks in the Navy's inpatient alcohol treatment program will not have an adverse effect on outcome. Program duration failed to have a significant impact on any of the seven outcomes measured, once other prognostic variables had been controlled for statistically. This was true not only for the primary dependent variable—a 4- versus 6-week treatment program—but was also true when length of stay was rendered as the actual number of days in treatment, regardless of program assignment. These findings should not be misinterpreted to mean that treatment time is unimportant; rather, once all other factors, including successful completion of the rehabilitation program and compliance with the aftercare plan, had been taken into account, length of stay did not add to the prediction of treatment success.

The study's main shortcoming was the lack of truly random assignment to treatment condition. Changes in the incoming patient population over time resulted in a 4-week sample that was significantly healthier than the 6-week sample in terms of background and alcohol use. Such changes were not anticipated, nor can they be explained from the data obtained, though post hoc analyses of the 4-week sample alone reflected a similar trend: patients admitted to treatment during the second half of the 4-week data collection period (November 1993 to May 1994) had better scores on a

number of prognostic indicators than did patients admitted during the first half of the period. These population changes coincided with the Navy's general personnel reductions, which peaked in 1994. Faced with an unstable employment situation, some individuals with alcohol problems and unremarkable performance records might have avoided seeking help for fear of damaging their careers or losing their jobs; others might have received early discharges (not necessarily alcohol-related) or had reenlistment requests denied as commands selectively trimmed their ranks, reserving treatment referrals for their better performers. Regardless of the reasons for the generally stronger profiles seen in patients presenting for treatment later in the data collection period, the differences posed a source of error variance that needed to be controlled for statistically; this was done by using multiple regression techniques.

Navy program directors are keenly interested in individualizing treatment, insofar as this is feasible within their operational constraints. A secondary objective of this study, therefore, was to examine whether certain definable types of patients would be successfully rehabilitated after a 4-week program while others required a full 6 weeks. Although the study was not specifically designed to develop patient-treatment matching algorithms, the comprehensive database facilitated these exploratory analyses. However, given the demonstrated equivalency of the 6- and 4-week programs in terms of both content and outcome, it is perhaps not surprising that analyses of the interactions between patient characteristics and length of stay produced null results. Mattson (1994) and others (Del Boca and Mattson, 1994; Project MATCH Research Group, 1993) have recommended that the treatments under comparison should be clearly differentiable. While 4 weeks is measureably distinct from 6 weeks, a 2-week difference in exposure to essentially the same treatment protocol might not constitute a sharp enough difference in terms of therapeutic processes.

One characteristic that has been associated with differential needs in treatment exposure time is the severity of the patient's condition at intake. Gottheil et al. (1992) found that longer lengths of stay were associated with better outcomes among low- and mid-level severity groups. These interactions were not found in the present study, however. It should be noted that the alcohol patients in the earlier work differed in many respects from participants in the present study. The former subjects were older and more racially mixed, with an average of eight previous treatment episodes for substance use problems; all had been detoxified for 5 to 7 days before entering the rehabilitation program, and many presented moderately severe medical, psychiatric, family, or employment problems. The Navy patients, on the other hand, exhibited more prognostic assets (e.g., younger, fully employed, few previous treatment episodes) and a relatively low level of problem severity. Compared with other normative patient cohorts, Navy alcohol patients scored significantly lower on clinical measures of both alcoholism and psychiatric symptomatology (Trent, 1995). In presenting a relatively restricted range of problem severity, the sample lacked the heterogeneity needed to detect differential responses to different lengths of stay. Research comparing various combinations of exposure (length of stay) and treatment modality, such as residential care, day patient, and outpatient treatment, would provide a more varied context for exploring patient-treatment interactions within the Navy's current 12-step framework.

The key to understanding why program duration was completely nonsignificant in this study may lie with the one variable that accounted for virtually all of the explained variance in outcomes, namely, aftercare attendance. Aftercare meetings serve to extend the principles of AA and the supportive treatment environment into the patient's ordinary life. In so doing, aftercare is both a predictor and a process variable, one which effectively moderates length of stay—in the present case, by as much as 52 weeks (12 months). Viewed in this light, a 2-week difference in formal treatment time, at least for these Navy participants, may have had negligible impact on outcomes at one year, relative to regular attendance at aftercare meetings during the preceding 12 months. Further research might investigate whether an even briefer hospitalization period, in conjunction with regular aftercare, would serve as well as a 4-week stay, though eliminating inpatient care altogether might not prove cost-effective. As Walsh and her colleagues (1991) found, even low-severity problem drinkers had better drinking outcomes when their attendance at AA meetings was preceded by a 3-week hospital stay, compared with patients assigned a treatment involving compulsory AA attendance only.

These findings should permit Navy policy-makers to confidently elect to shorten the Navy's standard inpatient alcohol treatment program to 4 weeks. In addition, it is hoped that this investigation will form the basis for further research. A well-designed matching study involving a combination of treatment modalities and durations could provide the most cost-effective guidelines for assigning individual patients to available treatment options.

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